attribute (data item) is stored. At the time that a new attribute is stored in the slot, the WHEN rule is processed. This implementation was chosen to improve the speed with which WHEN rules are processed. According to Mr. Perkins, the WHEN rule is asking whether a value occurs at, before, or after some time.

Mr. Eyles conversation with Mr. Perkins indicated that the implementation of WHEN-THEN rules by the LES system was fundamentally different from the implementation of WHEN statements in the claimed invention. However, it seemed necessary to find information in the published literature that would confirm this point. The enclosed Provost article is authored by M.P. Prevost and T.J. Laffey who are identified as being from the Lockheed Palo Alto Research Laboratory. This is the same organization as that of the authors (Perkins and A. Austin) of the Perkins' paper cited by the examiner. The relationship among these authors is further established by the fact that Laffey and Perkins appear as co-authors of other papers (e.g. the enclosed Laffey paper) discussing the capability of the LES system.

In describing the implementation of WHEN-THEN rules by LES, Prevost states that:

> Knowledge is represented in three forms: (1) a frame structure which gives a structural description of the device; (2) IF-THEN rules which describe how to identify faults; and (3) WHEN-THEN rules which control the reasoning process. The WHEN rules are attached to slots in the frame database, acting as <u>demons</u> to set up an agenda of relevant goals and sub-goals as the

troubleshooting proceeds.

Note that in another paper co-authorized by Perkins, namely the enclosed Read paper, "demons" are described as a "data-driven rules". The Prevost paper goes on to say that:

> The system also allows data-driven, forward chaining reasoning to occur through the use of its "WHEN" rules, a slight variation of procedural attachment and event-driven processing. These rules act at "demons" which come alive when certain events occur (i.e., attributes in the database acquire specified values). Furthermore, the WHEN rules are more efficient than standard production systems rules since they are examined for possible instantiation only when slots in the database (associated with its antecedent clauses) acquire values which are within the specified range.

The paper then presents an example of a WHEN rule concerning a device's output voltage and states that "The WHEN rule is attached to the "OUTPUT-VOLTAGE" slot in the DVS frame. When the slot is modified, the rule is checked for possible instantiation." Several paragraphs later, the same point is made again, "A WHEN rules [sic] is examined only when a slot in the database activates it..." and later ..."WHEN rules cause little overhead for the system since they are event-driven." The statements quoted in the previous section make it clear that the processing of WHEN rules by LES occurs when and only when a data item to which a WHEN rule has been attached is modified. Indeed, this implementation is claimed as a feature of the LES system, since it reduces overhead.

In contrast, the claimed WHEN statement (or rule) of

the subject invention is processed entirely independently of whether or not a data item is modified. The structure of the processing that invokes the WHEN rule is determined by the sequences that have been created by the programmer.

In other words, whereas in the subject invention "automatic and continuing iterative evaluations of whether the condition is fulfilled are provided until the condition is fulfilled", in LES, evaluation of WHEN rules is "event-driven". And, the subject invention assists the programmer by hiding the loops required to iteratively evaluate WHEN rules. In contrast, in the LES system such loops are not required in the first place because the corresponding processing takes place asynchronously, i.e., only when data items are modified.

Thus, it can be seen that the LES system and the claimed invention are fundamentally different in their processing of WHEN rules. Therefore, the LES method for evaluating WHEN-THEN rules as mentioned in Perkins does not anticipate or make obvious the claimed method for evaluating WHEN rules.

And, this fundamental difference is a consequence of the contrasting roles of the claimed invention and the LES system. Whereas the LES system supports the creation of expert systems that "reason" about a system, the claimed invention supports the creation of scripts that exercise real-time control over a system.

In summary, Perkin's LES system when-then rules are only activated when attributes in the data base acquire specified value. Thus, Perkin's does not teach or suggest any means for providing automatic and continuous iterative evaluations of whether the rules condition is fulfilled and Perkins' system when-then rules are dependent rather than independent on whether data affecting the condition changes as now claimed by the applicant.

Each of Examiner's previous rejections have been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this PRELIMINARY AMENDMENT is found to be INCOMPLETE, or if at any time it appears that a TELEPHONE CONFERENCE with counsel would help advance prosecution, please telephone the undersigned or his associate, Joseph S. Iandiorio, collect in Waltham, Massachusetts, (781)890-5678.

Respectfully submitted,

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